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Grafting and Storage of Fall-Collected Spruce and Pine Scions

by

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Part of the Provincial seed orchard program depends on propagation of plus trees through grafting. The scions required are usually collected in winter, but poor weather conditions and difficulty in access can make this awkward.

Since cones of various conifers must be collected at a specific time in the fall for seed quality evaluation and progeny testing, trials were undertaken to determine the feasibility of collecting scions at this time as well, with either immediate grafting or overwinter storage of the scions. These trials were established in 1976 and 1977 at the Ontario Forest Research Centre, Maple, and the Tree Improvement Centres at Angus and Thunder Bay.

Collection and Handling

Scions of white spruce *(Picea glauca)*, black spruce *(Picea mariana)* and white pine *(Pinus strobus)* (Table 1) were collected at Maple and Thunder Bay on September 21-22, 1976. The branches were immediately packed in wet peat moss in plastic bags. The packages were transported in portable coolers to their destination, either for immediate grafting or storage.

In 1977, more scions were collected at Angus on August 22 for white spruce; at Maple on August 22-23 for white spruce, on August 25 for black spruce, and on September 2 and 6 for white pine; and at Thunder Bay on September 2 for black spruce. The scions were treated as in 1976.

Scions for overwinter storage were kept in wet peat moss in plastic bags. In 1976, scions were either tightly bundled and kept at -3 to -2°C (Maple), or loosely packed and kept at 2 to 4°C (Thunder Bay). In 1977, scions at both Angus and Maple were loosely packed and kept at -6 to -4°C.

Grafting

In both years, scions designated for fall propagation were grafted within 7 days in most cases, although white spruce collected at Thunder Bay in 1976 was grafted at Maple 16 days later. Side grafts were made on potted seedling stock, using 10-15 scions/clone. The grafts were then placed in a framed bed, double shaded, and watered as necessary. The pots were covered before freezing for winter protection.

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TABLE 1 Survival percentage[a] of fall-grafted white spruce, black spruce and white pine assessed in July of the following year

White spruce					Black spruce					White pine				
Clone	Collected at	Survival % at[b] M	TB	A	Clone	Collected at	Survival % at[b] M	TB	A	Clone	Collected at	Survival % at[b] M	TB	A
1976 Collections														
SW6	Thunder Bay	0	0		SB1	Thunder Bay	60	31		5-154	Maple	90		
SW7	Thunder Bay	0	13		SB2	Thunder Bay	80	13		5-157	Maple	100		
SW8	Thunder Bay	0	29		SB3	Thunder Bay	80	0		5-1640	Maple	70		
SW9	Thunder Bay	0	7		SB4	Thunder Bay	80	27		5-1644	Maple	60		
SW10	Thunder Bay	0	71		SB5	Thunder Bay	20	40		5-1645	Maple	70		
S583		90			S49	Maple	50							
S584		60			S53	Maple	0							
S585		100			S57	Maple	10							
1977 Collections														
S-584	Maple	20			S53	Maple	90			5-410	Maple	73		67
S-585	Maple	90			S55	Maple	70			5-425	Maple	20		33
4400-1B	Thunder Bay	0	14		3400-6B	Thunder Bay	0	18		5-429	Maple	33		100
4400-2B	Thunder Bay	7	33		3400-7B	Thunder Bay	40	25		5-431	Maple	73		93
4400-3B	Thunder Bay	60	65		3400-8B	Thunder Bay	17	7		5-450	Maple	33		60
4400-4B	Thunder Bay	20	44		3400-9B	Thunder Bay	0	0						
4400-5B	Thunder Bay	47	25		3400-10B	Thunder Bay	8	8						
1	Angus	70		13										
2	Angus	50		7										
3	Angus	40		7										
4	Angus	90		27										
5	Angus	70		13										

[a] 10-15 scions/clone grafted

[b] M = Maple, TB = Thunder Bay, A = Angus

The stored scions were examined in early February. All living ones were side-grafted as with the fall stock. The grafts were kept in the greenhouse until June when they were placed outside under shade. Slight variation in treatment on both the fall and winter grafting occurred at the three Centres.

The survival of all grafts was assessed in July of the year following.

Results

The fall grafting gave positive but variable results (Table 1), probably due to handling, transportation and intensity of after-care. The results varied by location, clone and year. Although the data are not amenable to statistical analysis, they do show that successful fall grafting of white spruce, black spruce and white pine is possible.

Winter storage had a detrimental effect on most scions. Those stored at below-freezing temperatures at Maple and Angus had turned brown and the cambium was dead. In Thunder Bay most scions stored at above-freezing temperatures moulded and were also dead; the only exceptions were the black spruce scions collected in 1976. They were living when examined after storage and were grafted in the winter. The survival rates for these 5 clones (15 scions/clone grafted) ranged from 0 to 67%, with an average of 49.4%.

Thus, winter storage generally failed. The fall-collected scions were probably too tender for the sub-freezing temperatures in storage. However, when stored above-freezing they succumbed to mould infection. The one positive test with black spruce, however, merits further study, such as storing fungicide-treated scions at above freezing temperatures, etc.

Conclusions

Trials of scion collection in the fall, at the time of cone collection, and either fall grafting or winter-storage of the scions of white spruce, black spruce and white pine resulted in the following conclusions:

1. Grafting in the fall, immediately after scion collection, appears feasible.

2. Winter storage at sub-freezing temperatures of the scions appears unsuccessful, but use of above-freezing temperatures may not.

Acknowledgment

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